



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

Record of Proceedings, Including Reasons for Decision

In the matter of

Applicant Corporation de l'École Polytechnique de
Montréal

Subject Application for Renewal of the Non-power
Operating Licence for École Polytechnique de
Montréal's Non-power Reactor

Public Hearing May 15, 2013
Date

RECORD OF PROCEEDINGS

Applicant: École Polytechnique de Montréal Corporation

Address: P.O. 6079, succ. Centre-Ville, Montréal, Québec H3C 3A7

Purpose: Application for renewal of the non-power operating licence for Polytechnique Montréal's non-power reactor

Application received: September 17, 2012

Date of public hearing: May 15, 2013

Location: Canadian Nuclear Safety Commission (CNSC) Public Hearing Room, 280 Slater St., 14th. Floor, Ottawa, Ontario

Members present: M. Binder, Chair M. J. McDill
R. J. Barriault D.D. Tolgyesi
A. Harvey

Secretary: M.A. Leblanc
Recording Secretary: S. Gingras
Senior Legal Advisor: J. Lavoie

Applicant Represented By		Document Numbers
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Licence: renewed

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1. INTRODUCTION

1. The École Polytechnique de Montréal Corporation (Polytechnique Montréal) has applied to the Canadian Nuclear Safety Commission¹ (CNSC) for the renewal of the operating licence for its Safe LOW-POWER Critical Experiment (SLOWPOKE-2) non-power reactor, located in Montreal, Quebec. The current licence, PERFP-9A.02/2013, expires on June 30, 2013. Polytechnique Montréal has applied for the renewal of this licence for a period of 10 years.
2. The Polytechnique Montréal Slowpoke-2 reactor is a low-energy research reactor located in Polytechnique Montréal's main building. The 20 kW thermal SLOWPOKE-2 reactor is contained in a sealed chamber and submerged in a storage pool. The reactor has been in operation for 36 years and is used for research, teaching, neutron generation and isotope production.

Issues

3. In considering the application, the Commission was required to decide, pursuant to subsection 24(4) of the *Nuclear Safety and Control Act*² (NSCA) if:
 - a) Polytechnique Montréal is qualified to carry on the activity that the licence would authorize; and
 - b) in carrying out that activity, Polytechnique Montréal would make adequate provision for protection of the environment, the health and safety of persons, and the maintenance of national security and measures required to implement national obligations to which Canada has agreed.

Public Hearing

4. Pursuant to section 22 of the NSCA, the President of the Commission established a panel (hereinafter referred to as the Commission) to review the applicant's application. The Commission, in making its decision, considered information presented at a public hearing on May 15, 2013, in Ottawa, Ontario. The public hearing was conducted in accordance with the Canadian Nuclear Safety Commission *Rules of Procedure*.³ During the hearing, the Commission received written submissions and heard oral presentations from CNSC staff (CMD 13-H7 and CMD 13-H7.A) and Polytechnique Montréal (CMD 13-H7.1 and 13-H7.1A). Members of the public were invited to submit written interventions, but none were received.

¹The Canadian Nuclear Safety Commission is referred to as the "CNSC" when referring to the organization and its staff in general, and as the "Commission" when referring to the tribunal component.

²Statutes of Canada (S.C.) 1997, chapter (c.) 9.

³Statutory Orders and Regulations (SOR)/2000-211.

2. DECISION

5. On the basis of its consideration of the matter, as described in more detail in the following sections of this Record of Proceedings, the Commission concludes that Polytechnique Montréal is qualified to carry on the activities that the renewed licence will authorize and that, in carrying out those activities, it will make adequate provision for the protection of the environment, the health and safety of persons, and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

Therefore, the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, issues Licence PERFP-9A.00/2023 to l'École Polytechnique de Montréal for the operation of its SLOWPOKE-2 reactor. The licence will be valid from July 1, 2013 until June 30, 2023.

6. In the licence, the Commission includes the conditions as recommended by CNSC staff and set out in the draft licence attached to CMD 13-H7.
7. The Commission also accepts CNSC staff's recommendation regarding the delegation of authority in the Licence Conditions Handbook (LCH). The Commission notes that CNSC staff can bring any matter to the Commission as applicable. The Commission directs CNSC staff to inform the Commission annually of any changes made to the LCH.
8. The Commission directs CNSC staff to submit annual reports on the performance of the Polytechnique Montréal SLOWPOKE-2 reactor. CNSC staff shall present this report at a public proceeding of the Commission.
9. The Commission directs CNSC staff to provide an update on the decommissioning plan and the financial guarantee for Polytechnique Montréal's SLOWPOKE-2 reactor at the next annual report on SLOWPOKE reactors.

3. ISSUES AND COMMISSION FINDINGS

10. In making its decision under section 24 of the *Nuclear Safety and Control Act*, the Commission considered a number of matters related to Polytechnique Montréal's qualifications to carry out the proposed activities. It also examined the adequacy of the proposed measures to protect the environment, the health and safety of persons, and the maintenance of national security and measures required to implement national obligations to which Canada has agreed.

3.1 Management System

11. The Commission examined Polytechnique Montréal's management system, which

covers the framework that establishes the processes and programs required to ensure that the organization achieves its safety objectives and continuously monitors its performance against those objectives, while fostering a healthy safety culture.

12. Polytechnique Montréal detailed the administrative structure of Polytechnique Montréal and the SLOWPOKE laboratory, as well as the duties of each position in the laboratory.
13. Polytechnique Montréal reported that in 2010 it implemented its new quality assurance program, based on a set of procedures clearly defined in the Quality Assurance Manual. The purpose of the program is to ensure that activities related to the reactor are of a quality necessary to ensure the safety of the reactor and the laboratory. The program applies to all systems, structures and activities related to the operation of the reactor.
14. Polytechnique Montréal reported that several instances of non-compliance were identified following an internal audit of the quality assurance program, but that most were corrected in the new version of the Quality Assurance Manual published in February 2013.
15. CNSC staff indicated having conducted an inspection of the quality assurance program at Polytechnique Montréal in 2011. The measures taken by Polytechnique Montréal to remedy the deficiencies identified during that inspection were considered acceptable by CNSC staff.
16. CNSC staff indicated during the licence renewal hearings in 2003 that, although they were satisfied with the management system and the quality assurance processes used at the facility, the documentation of those processes needed to be improved to fully comply with CNSC requirements. Polytechnique Montréal reviewed and revised the documentation for its quality assurance program in accordance with CNSC quality assurance elements and principles for nuclear facilities. The revised program was presented to the CNSC in 2008. During a progress report on the performance of Polytechnique Montréal in 2009, CNSC staff noted that the documentation for the quality assurance program met their expectations and that Polytechnique Montréal's performance in this area was acceptable.
17. After reviewing the information presented, the Commission concludes that Polytechnique Montréal has appropriate management structures in place to adequately carry out the activities under the proposed licence.

3.2 Human Performance Management

18. This safety and control area encompasses activities that enable effective human performance through the development and implementation of processes. These activities ensure the licensee has sufficient numbers of staff, in all relevant fields, with the necessary knowledge, skills, procedures and tools to safely carry out their duties.

3.2.1 Staff Training

19. Polytechnique Montréal indicated that the reactor's operators, authorized users and authorized technicians must receive radiation protection training, which is updated every three years. The reactor's operators are also trained and certified in the packaging and transport of Type A package radioactive materials. Polytechnique Montréal also has a training program (initial and continuing), based on a systematic approach to training (SAT), which operators must complete in order to be and remain accredited.
20. CNSC staff confirmed that Polytechnique Montréal's training program for the SLOWPOKE-2 operators was developed using a SAT, which is the framework acceptable to the CNSC for the implementation of training activities for personnel accredited to operate the SLOWPOKE-2 reactor. The program was amended on the basis of feedback provided by CNSC staff following their reviews. CNSC staff accepted the revised program in 2009.
21. CNSC staff noted they had conducted an inspection in October 2009 to assess the effectiveness of the training processes currently used onsite and to measure the progress and results of the SAT program's implementation. CNSC staff indicated that the corrective measures requested following the inspections were implemented by Polytechnique Montréal in a timely manner and in accordance with the corrective action plan that CNSC staff had accepted.

3.2.2 Staff Accreditation

22. CNSC staff noted that under Polytechnique Montréal's licence for its SLOWPOKE-2 reactor, all persons appointed as operators, engineers or technicians assigned to the reactor must be accredited under the NSCA and its associated Regulations. According to CNSC staff, the performance of the licensee during the licence period in this specific area met regulatory requirements.
23. CNSC staff indicated that nuclear maintenance of the reactor can be carried out or supervised only by a person certified by the CNSC as a reactor engineer or technician. Polytechnique Montréal uses the services of a certified engineer or technician provided by Atomic Energy of Canada Limited (AECL).
24. The Commission enquired if there is a minimum complement of operators for SLOWPOKE reactors and sought information on the requirements to maintain qualification as an operator. CNSC staff responded that the minimum staffing requirement at a SLOWPOKE facility is one person. CNSC staff noted that the licence conditions allow the reactor to be operated remotely for up to 24 hours. CNSC staff further responded that operators can maintain certification by continuing their training program which involves carrying out weekly maintenance checks, as well as restarting and shutting down the SLOWPOKE reactor periodically.

25. The Commission enquired if CNSC certification is a prerequisite to be appointed as a reactor engineer or technician at a SLOWPOKE reactor facility. CNSC staff responded that certification is a prerequisite and that individuals must be certified before they are appointed.

3.2.3 Conclusion on Human Performance Management

26. Based on this information, the Commission concludes that Polytechnique Montréal has suitable human performance management structures, and that the operation of the SLOWPOKE-2 reactor shows Polytechnique Montréal's ability to adequately carry out the activities authorized under its licence.

3.3 Operating Performance

27. Operating performance includes operating policies, reporting and trending, and the application of operating experience (such as root-cause analysis and corrective actions) that demonstrate the licensee's effective performance, as well as improvement plans and significant future activities.
28. Polytechnique Montréal indicated that the Department of Engineering Physics is responsible for, operates and maintains the laboratory facilities.
29. Polytechnique Montréal detailed the procedures that are in place for operating and maintaining the reactor, as well as the inspection and maintenance activities. Polytechnique Montréal indicated that the *Operating Manual*, Revision 8, June 2009, was submitted to the CNSC, and that it followed the procedures described therein.
30. CNSC staff indicated they have established a risk-based monitoring and compliance plan, which consists of onsite inspections and reviews of the documents submitted in accordance with licence requirements. These documents include annual compliance reports, investigation reports on reportable events, and all other reports required by the CNSC under the NSCA and its regulations.
31. CNSC staff reviewed the annual compliance reports submitted by Polytechnique Montréal, communicated regularly with the facility's management, and noted that no issue was identified respecting the safe operation of the reactor.
32. CNSC staff noted that it had conducted routine compliance inspections during the licence period to evaluate the facility's operation and maintenance and to verify its programs. Based on these compliance activities, CNSC staff consider that the programs related to the facility's maintenance and operation are acceptable.
33. Polytechnique Montréal noted that no unintended events occurred during the current licence period. CNSC staff concurred.

34. The Commission sought information on the consistent satisfactory ratings the SLOWPOKE-2 reactors received across all 14 safety and control areas and the differences amongst facilities. CNSC staff responded that the rating system was systematically applied to all of the SLOWPOKES for the first time for the purpose of the licence application assessments, and explained that in the absence of previous data with respect to the ratings for these facilities, it is difficult to differentiate between a satisfactory and fully satisfactory rating. CNSC staff further responded that there are no significant differences between the SLOWPOKE-2 reactors in terms of design and safety.
35. After reviewing the information presented, the Commission concludes that operating performance demonstrates Polytechnique Montréal's ability to successfully carry out the activities under the requested licence, protect the environment and adequately safeguard the health and safety of persons.

3.4 Safety Analysis

36. Safety analysis is a systematic evaluation of potential hazards associated with the conduct of a proposed activity or facility and considers the effectiveness of preventive measures and strategies in reducing the effects of such hazards. It supports the facility's overall safety case.
37. Polytechnique Montréal reported that the safety analysis was conducted in 1998, and can be found in the safety report. Polytechnique Montréal provided a detailed description of the nature and activity of the radionuclides expected to be present in the SLOWPOKE reactor's fuel during the reactor's normal operation. A subsequent analysis was necessary following the observation of levels of fission products that were higher than anticipated. The analysis provided satisfactory explanations for those fission products. At the CNSC's request, Polytechnique Montréal also reviewed its safety analysis following the nuclear accident in Fukushima, and the report submitted to the CNSC revealed that no amendment to the report was necessary.
38. During the proposed licence period (2013–2023), Polytechnique Montréal does not anticipate making changes to the reactor's equipment or operating procedures that would require new safety analyses. However, Polytechnique Montréal does intend to update its safety report during that period to incorporate the minor analyses and amendments made since 1998.
39. CNSC staff consider that the safety report provides acceptable measures for responding to conceivable scenarios and abnormal situations that could lead to emergencies.
40. CNSC staff reported that during the current licence period, compliance inspections were conducted, and CNSC staff verified that the licensee had maintained all the safety barriers and protection systems in accordance with requirements.

41. The Commission sought information from CNSC staff on the design standards of the SLOWPOKE reactors that would enable common safety analyses, training development programs or aging management. CNSC staff responded that AECL was originally responsible for the development of the SLOWPOKE reactor safety analysis, and that specific safety analyses were developed to adapt to changes in each facility. CNSC staff also noted that aging management and training programs are specific to each SLOWPOKE facility. CNSC staff added that in regards to the similarities in the licence applications, CNSC staff highly encourages the SLOWPOKE licensees to use the application guides that follow the safety and control area framework to facilitate systematic evaluation by CNSC staff.
42. The Commission enquired if a consulting advisory committee has been established amongst the SLOWPOKE facilities. The Commission was informed that there is a SLOWPOKE Users Group and that members of this group communicate several times a year by email and meets on occasion.
43. On the basis of the information presented, the Commission concludes that the safety analysis and the barriers in place provide a positive indication of the safety of the SLOWPOKE reactor at Polytechnique Montréal.

3.5 Physical Design

44. Physical design relates to activities that have an impact on the ability of structures, systems and components to meet and maintain their design basis, given new information arising over time, planned modifications to the facility, and changes in the external environment.
45. Polytechnique Montréal indicated that the reactor's operation and weekly maintenance are carried out by CNSC-accredited operators. Nuclear maintenance is carried out every three years by a nuclear engineer approved by the CNSC.
46. Polytechnique Montréal noted that the minor modifications to the irradiation systems are controlled in accordance with the quality assurance manual's change control procedure. Maintenance of the reactor facility is provided by laboratory staff according to procedures in the operating manual. Maintenance and repairs to the laboratory premises are provided by Polytechnique Montréal's Building Services, and maintenance of the fire and alarm systems is provided by Polytechnique Montréal's Institutional Security Service.
47. Polytechnique Montréal indicated that performance indicators are recorded in weekly maintenance logs, annual and biannual audits of the reactor systems, structures and components (SSCs), following the procedures in the operating manual. An annual performance summary of the reactor's SSCs is sent to the CNSC as part of the annual compliance report.
48. Polytechnique Montréal stated that the electrical infrastructure undergoes regular

maintenance, with changes made when there are renovations.

49. Polytechnique Montréal plans to install a new irradiation system and automatic counting system that will be attached to the reactor's irradiation site no. 8. This new external system will not affect the reactor or its operation. Polytechnique Montréal also has plans to improve the system for moving the concrete blocks in the pool, to make it safer. A new ventilation system is scheduled to be installed in the laboratory in summer 2013.
50. CNSC staff indicated that no significant changes were made to the facility's design, physical design or safety assessment during the licence period. However, minor changes were made to improve the facility's operation and maintenance, as detailed above. These changes were reported in the annual compliance reports submitted to the CNSC. CNSC staff also noted that changes to the facility are controlled in accordance with the facility's change control procedure documented in the Quality Assurance Manual.
51. On the basis of the information provided, the Commission concludes that the physical design of Polytechnique Montréal's SLOWPOKE-2 reactor is adequate.

3.6 Fitness for Service

52. Fitness for service covers activities performed to ensure the Polytechnique Montréal SLOWPOKE reactor's SSCs continue to effectively fulfill their intended purpose.

3.6.1 Reactor Maintenance and Changes

53. Polytechnique Montréal indicated that results of all operations carried out on the reactor are recorded in the reactor's logs. In addition, after each nuclear maintenance operation, the nuclear engineer, who is an employee of Atomic Energy of Canada Limited, sends a report to the authority in charge of the reactor, detailing the work done and the results of the start-up validation tests conducted on the systems, structures and components affected by the work. Every step of the nuclear maintenance work is duly recorded in the reactor's operating manual. CNSC staff concurred.
54. CNSC staff considers that there is a well-established program for the maintenance, calibration and testing of the SLOWPOKE reactor. The purpose of the program is to ensure the reliability of the facility's systems and components.
55. Polytechnique Montréal indicated that the reactor safety committee meets at least once a year to discuss reactor safety issues. According to the change control procedure, every change that impacts the safety of the reactor must be approved by the committee.
56. Polytechnique Montréal noted that the results of the safety analysis are proof of the reactor's reliability, and that its fitness for service is confirmed by the results of the

regular inspections, which are sent annually to the CNSC in the reactor's annual compliance report.

57. CNSC staff stated that its review of the reactor's annual compliance reports, as well as the results of the routine compliance inspections carried out by CNSC staff, confirm the fitness for service of the SLOWPOKE-2 reactor's systems and components.
58. The Commission sought further information on inspections of the SLOWPOKE-2 reactors. CNSC staff responded that the licensee monitors the reactor on a regular basis and that CNSC staff perform regular visual inspections. CNSC staff added that only AECL staff, certified technicians and reactor engineers are authorized to open the reactor vessel to perform visual inspections and that CNSC staff coordinate their inspections to observe this activity.
59. The Commission sought information regarding potential impacts on the operations of SLOWPOKE reactors if AECL discontinues their maintenance services. CNSC staff noted that they are monitoring the situation. CNSC staff also noted being satisfied with AECL's letter of commitment to service the SLOWPOKE reactor until 2019.
60. The Commission enquired as to what services AECL provides to SLOWPOKE reactors. CNSC staff responded that AECL provides two services including maintenance (addition of beryllium plates or shims) and refuelling the reactor core. CNSC staff noted that these services are administered by certified technicians and nuclear engineers. CNSC staff added that there would be no safety concerns if AECL no longer services the SLOWPOKE reactors in the future but that operations would be limited.
61. Relating to the maintenance of the reactor by AECL, the Commission enquired on the possibility of a hold point to be issued for 2019-2020. CNSC staff responded that it would be difficult to define a specific time with respect to a hold point as the remaining usage of the core depends on the frequency of operation. CNSC staff reiterated that there would not be any safety concerns if the reactor core's fuel is completely spent as the reactor could no longer be in operation. Also, CNSC staff noted that the lack of a maintainer such as AECL would not raise any safety concerns but would limit future operations. CNSC staff further responded that their planned annual reports to the Commission would serve as a mechanism to provide updates on upcoming issues such as AECL's organization restructuring as well as fuelling and refuelling requirements for each of the SLOWPOKE facilities.

3.6.2 Aging Management

62. Polytechnique Montréal indicated that the reactor's aging management process, which is supported by a set of management and operating procedures, was detailed in the SLOWPOKE reactor aging management program submitted to the CNSC in August 2012. CNSC staff has examined the information submitted and found it acceptable. CNSC staff recommended that Polytechnique Montréal improve its

acquisition of operational experience, as well as its assessment of trends. Polytechnique Montréal has revised its aging management program to incorporate these recommendations.

63. CNSC staff concludes that Polytechnique Montréal considers the aging of materials and components in its facility maintenance and monitoring activities, and that the facility can be expected to be operated safely and reliably until the end of the proposed licence period.
64. With regards to aging management, the Commission asked for information on the areas of concern with respect to the SLOWPOKE-2 reactor equipment and how these areas are monitored. CNSC staff responded that the majority of the reactor components can be monitored directly or indirectly by certified staff during weekly maintenance where staff measure radiation fields and samples the reactor pool water. CNSC staff noted that highly enriched uranium cores (HEU-core) tend to be more porous, older and more susceptible to aging than low enriched uranium cores (LEU-core). CNSC staff added that there are no safety concerns with respect to the aging of the SLOWPOKE-2 reactor.

3.6.3 Conclusion on Fitness for Service

65. The Commission is satisfied with Polytechnique Montréal's programs for the reactor's inspection, maintenance and aging management. On the basis of the information submitted, the Commission concludes that the equipment used at Polytechnique Montréal's SLOWPOKE-2 reactor facility is fit for service.
66. The Commission encourages SLOWPOKE reactor licensees to meet in order to determine a preferred method to ensure maintenance of the reactors, noting that AECL's letter of commitment regarding the reactors' maintenance expires in 2019.

3.7 Radiation Protection

67. In evaluating the adequacy of the provisions for protecting the health and safety of persons, the Commission reviewed Polytechnique Montréal's program to ensure that both contamination and radiation doses to persons are monitored, controlled and kept as low as reasonably achievable (ALARA), with social and economic factors taken into account.
68. Polytechnique Montréal stated that the purpose of the radiation protection program in place at Polytechnique Montréal is to minimize the doses received by staff, students and the public. The program will be maintained during the period of application for the requested licence. CNSC staff confirmed that Polytechnique Montréal's radiation protection program is in place to guide users of radioactive materials and devices that emit ionizing radiation, and that the program and its implementation are acceptable.
69. Polytechnique Montréal detailed the procedures and measures in place for handling and

storing nuclear materials.

70. Polytechnique Montréal noted that an ALARA program is in place at the SLOWPOKE laboratory, and described the activities outlined in the program for minimizing the doses received by workers.

3.7.1 Doses to Members of the Public

71. Polytechnique Montreal noted that the maximum partial dose calculated for a person living in the residence closest to the SLOWPOKE laboratory is 0.000012 millisieverts/year (mSv/y), which has no effect on health. CNSC staff reported they had conducted an independent and very conservative study of doses to the public in connection with all gases released by SLOWPOKE-2 facilities, and obtained an estimate of less than 0.000085 mSv/y, which is well below the regulatory limit of 1 mSv/y.

3.7.2 Doses to Workers

72. Polytechnique Montréal noted that external doses received by workers have always been maintained below 1 mSv/y, with reactor operators receiving an average yearly dose of 0.12 mSv, which has no impact on health. CNSC staff noted there were no persons designated as nuclear energy workers at the SLOWPOKE-2 facility.

3.7.3 Inspections and Incidents

73. CNSC staff regularly conducted Category II inspections. CNSC staff noted those inspections demonstrated that Polytechnique Montréal has complied with regulatory radiation protection requirements and that Polytechnique Montréal has effectively controlled worker contamination during the current licence period.
74. CNSC staff reported that no incident entailed the exceedance of an action level at Polytechnique Montréal .

3.7.4 Conclusion on Radiation Protection

75. On the basis of the information provided, the Commission is of the opinion that the radiation protection program and its implementation meet the regulatory requirements and are adequate to protect the workers at Polytechnique Montréal's SLOWPOKE-2 reactor facility and the public.

3.8 Conventional Health and Safety

76. Conventional health and safety covers the implementation of a program to manage workplace safety hazards and to protect personnel. The conventional health and safety program is mandated for all employers and employees to minimize risk to the health

and safety of workers posed by conventional (non-radiological) hazards in the workplace. The program includes compliance with the applicable labour codes and conventional safety training.

77. Polytechnique Montréal indicated it is currently taking inventory of all the hazardous materials present in its establishments. Polytechnique Montréal also detailed the other hazardous materials stored within the perimeter of the SLOWPOKE-2 reactor facility.
78. Polytechnique Montréal stated that several documents or programs on health and safety are available. Polytechnique Montréal added that, since 2002, there have been no lost-time injuries to employees or students involving nuclear materials. CNSC staff confirmed this assertion.
79. CNSC staff consider that Polytechnique Montréal's performance in the area of safety is satisfactory. This conclusion is based on the information obtained from CNSC compliance inspections, Polytechnique Montréal's annual compliance reports and event reports.
80. Upon consideration of the information provided, the Commission considers that Polytechnique Montréal's performance in terms of the conventional health and safety of its workers is acceptable.

3.9 Environmental Protection

81. Environmental protection covers Polytechnique Montréal's programs to identify, control and monitor all releases of nuclear substances and to minimize the effects on the environment that may result from the licensed activities. It includes effluent and emissions control and environmental monitoring.
82. Polytechnique Montréal indicated that the operating manual contains the procedure for monitoring the reactor's emissions. The procedure was developed using analyses documented in the reports submitted to the CNSC.
83. Polytechnique Montréal stated that the SLOWPOKE reactor does not emit solid or liquid radioactive substances, and only emits weak gaseous radioactive substances. CNSC staff confirmed this assertion. Polytechnique Montréal gave a detailed description of the hazardous radioactive materials generated by the laboratory. Polytechnique Montréal also detailed the methods used for the internal handling and transportation of radioactive materials.
84. Polytechnique Montréal indicated that the annual compliance report sent to the CNSC shows average weekly emissions for the period covered by that report. Since 1998, there have been typical weekly emissions of 240 MBq of argon-41 and of 2.4 MBq of xenon-133. Polytechnique Montréal does not foresee making any changes to the reactor equipment or procedures in the requested licence period that would cause an

increase in the release of radioactive or non-radioactive materials.

85. CNSC staff reported that the primary hazardous substances used in the normal operation of the SLOWPOKE-2 facility are sodium hydroxide and hydrochloric acid. These are used to regenerate resins in the vessel water purification system, and are mixed to obtain a neutral pH before being dumped into the sewers.
86. CNSC staff considers that Polytechnique Montréal has effective programs and procedures for protecting the environment and the health of persons, including the identification and control of releases of radioactive and hazardous substances to the environment.
87. According to the information provided, the Commission concludes that Polytechnique Montréal is applying, and will continue to apply, the measures necessary to protect the environment.

3.10 Emergency Management and Fire Protection

88. Emergency management and fire protection covers the provisions for preparedness and response capabilities that exist for emergencies and non-routine conditions at Polytechnique Montréal, including nuclear emergency management, conventional emergency response and fire protection and response.

3.10.1 Emergency Management

89. Polytechnique Montréal noted that the maintenance of the security and alarm response systems is managed by the Institutional Security Service. These systems are inspected twice a year, and the results of the inspections are sent to the CNSC as part of the annual compliance report.
90. CNSC staff reported it had reviewed the document with respect to Polytechnique Montréal's emergency and response measures, as well as Polytechnique Montréal's response to the letter from the CNSC, sent pursuant to subsection 12(2) of the NSCA after the events in Fukushima. CNSC staff stated that the safety report for the SLOWPOKE-2 facility does not identify any event leading to accidental releases, and that the Fukushima event did not change the conclusions of the safety report.

3.10.2 Fire Protection

91. Polytechnique Montréal indicated that the École Polytechnique de Montréal Corporation maintains and uses a fire protection program that is subject to Quebec building and fire codes. This program covers the SLOWPOKE laboratory facility, and is detailed in CMD 12-H7.1.
92. Polytechnique Montréal noted that the fire alarm system was upgraded throughout the

building in 2010. The Institutional Security Service conducts annual inspections of the fire alarm system and sprinkler system, as well as monthly inspections of the extinguishers. Work to bring the laboratory firewalls into compliance was carried out in August and September 2012. In addition, Polytechnique Montréal, under the management of Building Services, initiated several projects in 2008 to bring the facility and its infrastructure into compliance with Quebec building and fire codes, and described those projects.

93. CNSC staff confirmed that Polytechnique Montréal has implemented and maintains a fire protection program that minimizes the probability of occurrence and the impact of a fire in the facility. This program was established to comply with applicable provincial and federal regulatory requirements. CNSC staff consider this program acceptable.
94. CNSC staff indicated it had conducted inspections of the SLOWPOKE-2 facility and had identified areas for improvement in the area of fire protection, particularly the firewalls and flammable materials. Polytechnique Montréal has implemented corrective measures to the satisfaction of CNSC staff.

3.10.3 Conclusion on Emergency Management and Fire Protection

95. On the basis of this information, the Commission concludes that Polytechnique Montréal's emergency preparedness measures and fire protection measures are adequate for the period of operation authorized under the current licence.

3.11 Waste Management

96. Waste management covers the licensee's site-wide waste management program. The Commission evaluated Polytechnique Montréal's performance with respect to waste minimization, segregation, characterization and storage.
97. Polytechnique Montréal noted that the management of household and hazardous waste follows the sustainable development policy adopted by the Board of Directors on January 27, 2011, and CNSC staff concurred. Polytechnique Montréal detailed its radioactive waste management and storage activities. Polytechnique Montréal added that the annual compliance report provides the CNSC with information on the inventory of the content of the radioactive waste barrel, which contains substances irradiated in the reactor's irradiation sites.
98. CNSC staff confirmed that a waste management program is in place at the facility. CNSC staff consider the program acceptable.
99. The Commission asked if follow-up was done with the company that handles Polytechnique Montréal's radioactive waste. CNSC staff confirmed that the company has a valid permit and is regularly inspected. The company also informs CNSC staff of locations where the waste is stored.

100. On the basis of the information submitted at this hearing, the Commission considers that Polytechnique Montréal is taking, and will continue to take, all the measures required for waste management at Polytechnique Montréal's SLOWPOKE-2 reactor facility.

3.12 Security

101. This area of safety and control covers the programs required to implement and support the safety requirements for Polytechnique Montréal's SLOWPOKE reactor.
102. Polytechnique Montréal stated that the safety measures are detailed in the confidential SLOWPOKE reactor security plan. Access to the SLOWPOKE laboratory and the reactor room is always controlled.
103. Polytechnique Montréal noted that the surveillance and intrusion alarm system at the SLOWPOKE laboratory was improved by the replacement of the facility access system and the installation of several high-definition surveillance cameras. The Institutional Security Service inspects these security systems regularly, and the results of those inspections are included in the annual compliance report.
104. CNSC staff reported that they conducted three security inspections at the facility over the course of the current licence period, and that all problems identified have been corrected.
105. CNSC staff considers that Polytechnique Montréal has an acceptable security program in place that meets regulatory requirements and makes adequate provisions for the maintenance of national security.
106. The Commission requested further information on the safety measures in place for preventing malevolent acts by students or researchers. The Polytechnique Montréal representative explained that there are several barriers to cross before accessing the fuel in the reactor. She added that no one has access to the reactor room unless accompanied by an operator, and that the inventory of calibration sources is kept up-to-date. CNSC staff indicated they carried out a safety inspection in December 2012 and that the licensee met CNSC requirements. CNSC staff added that all deficiencies identified in that inspection have been corrected.
107. The Commission concludes that Polytechnique Montréal has applied, and will continue to apply, the appropriate measures for ensuring the physical security of its SLOWPOKE-2 reactor facility.

3.13 Safeguards and Non-Proliferation

108. The CNSC's regulatory mandate includes ensuring conformity with measures required

to implement Canada's international obligations under the *Treaty on Non-Proliferation of Nuclear Weapons*. Pursuant to the Treaty, Canada has entered into safeguards agreements with the International Atomic Energy Agency (IAEA). The objective of these agreements is for the IAEA to provide credible assurance on an annual basis to Canada and to the international community that all declared nuclear material is in peaceful, non-explosive uses and that there is no undeclared nuclear material or activities in this country.

109. Polytechnique Montréal stated it had fulfilled all of its security obligations. Every year, the person in charge of the reactor sends the CNSC an update on the protocol terms as well as the facility's operating schedule and physical inventory. The same person also sends the CNSC the general ledger for the SLOWPOKE reactor every month.
110. AECL staff conducted an inspection of the facility in January 2010. The inspection revealed that Polytechnique Montréal is fulfilling all of its obligations in this area. CNSC staff noted that no action notice had been issued following either AECL's or the CNSC's inspection.
111. CNSC staff consider that effective programs are in place at Polytechnique Montréal's SLOWPOKE-2 reactor facility. CNSC staff added that, during the licence period, Polytechnique Montréal provided the CNSC and AECL with all of the reports and information required to comply with the regulatory requirements for the SLOWPOKE-2 reactor, including those related to accounting and the reporting of nuclear materials.
112. On the basis of this information, the Commission considers that Polytechnique Montréal has made and will continue to make adequate provisions in the areas of safeguards and non-proliferation, to ensure the maintenance of national security and the implementation of the national obligations to which Canada has agreed.

3.14 Packaging and Transport

113. Packaging and transport covers the safe packaging and transport of nuclear substances to and from Polytechnique Montréal. Polytechnique Montréal must adhere to the *Packaging and Transport of Nuclear Substances Regulations*⁴ and Transport Canada's *Transportation of Dangerous Goods Regulations*⁵ for all shipments leaving the site. The *Packaging and Transport of Nuclear Substances Regulations* apply to the packaging and transport of nuclear substances, including the design, production, use, inspection, maintenance and repair of packages, and the preparation, consigning, handling, loading, carriage and unloading of packages containing nuclear substances.
114. Polytechnique Montréal provided details on the measures in place for shipping nuclear substances, as well as for their preparation for shipping. Polytechnique Montréal stated

⁴SOR/2000-208

⁵SOR/2001-286

that hazardous materials are transported in accordance with applicable regulations and that employees assigned to this task have received the appropriate training. CNSC staff confirmed this assertion.

115. In 2013, Polytechnique Montréal plans to improve the procedure for shipping nuclear materials to other licensees, including receiving, loading and packaging nuclear substances for transport.
116. On the basis of the information obtained from compliance inspections and the review of Polytechnique Montréal's compliance reports and event reports, CNSC staff concluded that Polytechnique Montréal operated the facility safely. CNSC staff considers that, overall, Polytechnique Montréal has demonstrated that it complies with the regulations applicable to this safety area.
117. On the basis of the information provided, the Commission considers Polytechnique Montréal's performance in this area to be acceptable.

3.15 Environmental Assessment

118. Before making a licensing decision, the Commission must be satisfied that all applicable requirements of the *Canadian Environmental Assessment Act*⁶ (CEAA 2012) have been fulfilled.
119. CNSC staff determined that the licence renewal application does not fall under "designated projects" pursuant to the *Regulations Designating Physical Activities* under subparagraph 84(a)(i) of the CEAA 2012. Therefore, no federal environmental assessment is required.
120. The Commission is satisfied that requirements of the CEAA have been met. The Commission notes that the NSCA provides a strong regulatory framework for environmental protection. Whether an EA is required or not, the CNSC regulatory system ensures that adequate measures are in place to protect the environment and human health in accordance with the NSCA and its Regulations.

3.16 Aboriginal Consultation

121. The CNSC's legal duty to consult with Aboriginal peoples applies when the Crown contemplates actions that may adversely affect established or potential Aboriginal or treaty rights. As an agent of the Government of Canada and as Canada's nuclear regulator, the Commission must act in accordance with the Constitution and its imperatives. The Commission ensures that its licensing decisions under the *Nuclear Safety and Control Act* and environmental assessment determinations under the CEAA uphold the honour of the Crown.

⁶S.C. 2012, c. 19, s. 52

122. CNSC staff reported that they conducted research that led to a preliminary list of First Nations and Métis groups and organizations that could have an interest in the licensing decision. CNSC staff added that the Polytechnique Montréal campus is in a region in southern Quebec that is not subject to any historical or modern treaties with First Nations. However, some of the Aboriginal groups identified are involved in comprehensive or specific land claims and governance negotiations with the Government of Canada.
123. CNSC staff indicated that it sent notification letters to the groups identified, including information on the licence application and the public hearing process. The First Nations and Métis groups were encouraged to participate, and follow-up calls were made.
124. Based on the above information, the Commission notes that the Aboriginal groups who may be interested or affected by the decision have been well informed of the licence renewal application and the intervention process, and that the efforts made by Polytechnique Montréal and CNSC staff in this area were satisfactory.

3.17 Public Information Programs

125. The CNSC requires all Class I nuclear facility licensees to establish and implement a public information program to inform persons living near the facility on how licensed activities conducted at the facility affect the environment and the health and safety of the community.
126. Polytechnique Montréal noted that information on the SLOWPOKE-2 reactor and its facility are on the website and that the laboratory is visited by over 200 students a year.
127. CNSC staff confirmed that Polytechnique Montréal's SLOWPOKE-2 reactor facility has a Web site with information on the reactor, its location, activities that take place there, and contact information. CNSC staff added that since the facility was built, several articles have appeared in student and faculty papers, and feature stories have aired on television and on the radio. CNSC staff considers that the facility has been open in its responses to requests for information from the public and offers visits to interested parties.
128. CNSC staff noted that Polytechnique Montréal is currently updating its program to meet the requirements of the applicable sections of RD/GD-99.3, *Public Information Programs*, published in March 2012.
129. The Commission expressed the view that the public information program seems incomplete, and requested Polytechnique Montréal's opinion on the matter. The Polytechnique Montréal representative agreed that the program could be improved. The Polytechnique Montréal representative added that she had decided over the past few

weeks to be more proactive in this area, further to the publication of RD/GD-99.3. Polytechnique Montréal intends to use her public relations service to this effect. CNSC staff commented that RD/GD 99.3 is a generic document, and that it had worked with the public communications group to better define its expectations for each type of licensee, with the implementation of new requirements, using a phased approach.

130. The Ecole Polytechnique representative noted that, even if they are willing to make the necessary changes to respect requirements relating to public information, she expressed concerns regarding an increased volume of work related to the new public information requirements that would prevent a facility from doing safety-related work at the nuclear reactor. CNSC staff noted being willing to discuss with the licensees on this topic, taking into account that there are essential elements to be included in a public information program. The Commission commented that part of the CNSC's mandate is to disseminate factual information to the public about nuclear science, and the licensees public information programs is one way for the Commission to fulfill this mandate. The Commission considers that not disclosing information that should have been made public is a behaviour that should be avoided. The Ecole Polytechnique representative expressed his agreement on the communication on nuclear science to the public for them to understand the usefulness of this industry.
131. On the basis of this information, the Commission considers that Polytechnique Montréal's public information program meets regulatory requirements and allows people living near its SLOWPOKE-2 nuclear reactor to be kept informed.

3.18 Decommissioning Plan and Financial Guarantees

132. The Commission asked the licensee to establish a decommissioning plan for Polytechnique Montréal's SLOWPOKE-2 nuclear reactor. To ensure that sufficient funds are available for the safe and secure decommissioning of Polytechnique Montréal's SLOWPOKE-2 nuclear reactor, the Commission requires that an adequate financial guarantee for the execution of the planned activities be instituted and remain acceptable in the Commission's estimation throughout the licence period.
133. Polytechnique Montréal stated that the decommissioning draft document is revised every five years. The latest version of the document was submitted to the CNSC in December 2011.
134. Polytechnique Montréal estimates that in 2017, the total cost of decommissioning its reactor will be \$2,050,000. Polytechnique Montréal indicated that it obtained this number using the assumption that the decommissioning will be carried out by external contractors and that the reactor's operating history will be preserved in accordance with existing regulatory programs. Polytechnique Montréal proposed a financial guarantee in three parts:
 - a letter of credit from a Canadian bank guaranteeing \$1,000,000 for the decommissioning

- a trust fund, established on January 27, 2005, and in which \$257,000 was placed in December 2012 and in which \$25,000 will be placed in 2013 and each following year until 2032. In 2032, the amount accumulated in the fund will be \$750,000 plus interest.
- Polytechnique Montréal is formally committed to adding the amount required to complete the three phases of decommissioning

135. In March 2013, Polytechnique Montréal made a proposal to the CNSC for a new, improved financial guarantee consistent with the new decommissioning plan for the reactor. CNSC staff reviewed the most recent version of the financial guarantee and disagreed with the revised value of the decommissioning costs and, consequently, with the value of the proposed financial guarantee, which is significantly lower – almost half of the value of the financial guarantees proposed by other SLOWPOKE licensees. CNSC staff also has reservations with respect to the methods used to estimate the decommissioning costs. CNSC staff recognizes that further discussions with Polytechnique Montréal on the topic are needed, in part because of the fundamental differences between the decommissioning approach proposed by Polytechnique Montréal and that of other SLOWPOKE licensees, which is more of a turnkey approach. Polytechnique Montréal demonstrated willingness to continue discussions.
136. Polytechnique Montréal plans to decommission its SLOWPOKE reactor in 2032 using the amount accumulated in the trust fund. Polytechnique Montréal stated that, should it become necessary to decommission the reactor before 2032 and the amount required not be available in the general operating budget, the balance required to at least complete the decommissioning would be borrowed using the letter of credit..
137. CNSC staff indicated that a condition has been added to the Licence Conditions Handbook, which indicates November 30, 2013 as the deadline for defining an acceptable financial guarantee. In the event of a dispute, CNSC staff will inform the Commission of the situation and will provide recommendations.
138. On the basis of this information, the Commission concludes that both the current financial guarantee for the decommissioning of Polytechnique Montréal's SLOWPOKE-2 reactor and the decommissioning plan are acceptable for the purpose of the licence renewal. The Commission notes the difference in opinion between Polytechnique Montréal and the CNSC with respect to the new financial guarantee and encourages both parties to continue discussions to reach an agreement.
139. The Commission directs CNSC staff to provide an update on this matter at the next annual report on SLOWPOKE reactors.

3.19 Nuclear Liability Insurance and Cost Recovery

140. Polytechnique Montréal is required to hold nuclear liability insurance under the *Nuclear Liability Act*.⁷
141. Polytechnique Montréal confirmed that it meets its nuclear liability insurance requirements with the liability insurance policies it has in place. CNSC staff confirmed that Polytechnique Montréal holds the required insurance.
142. CNSC staff indicated that, as Polytechnique Montréal is a post-secondary, not-for-profit educational institution, the licensee is exempt from cost recovery fees.
143. On the basis of the information received, the Commission concludes that Polytechnique Montréal is fulfilling its nuclear reliability obligations.

3.20 Licence Periods and Conditions

144. Polytechnique Montréal has applied for a ten-year licence renewal. CNSC staff also recommends the renewal of the licence for a period of 10 years, the same period as for the current licence.
145. CNSC staff proposed to modify the content and format of the licence to improve regulatory clarity, consistency and predictability, while maintaining adequate regulatory oversight. To ensure that there is a clear understanding of each regulatory requirement specified by the Commission in the licence, CNSC staff proposes a licence accompanied by a Licence Conditions Handbook (LCH).
146. The Commission sought comments from SLOWPOKE licensees on the CNSC's transition from licence conditions to the LCH. The Commission was informed that the SLOWPOKE facilities had the opportunity to review three draft LCHs and found that, while they find the LCH useful in detailing how to meet regulatory requirements and intend on doing their best to comply with the LCH, this document was overwhelming and the administrative and technical conditions and requirements are complex and not necessarily applicable to the SLOWPOKE facilities. CNSC staff further noted that the graded approach was applied to the development of the LCH to specify exact licence conditions that apply to each specific licensee.
147. The Commission sought comments on the references in the LCH to documents from the past and asked if updating was required. CNSC staff responded that SLOWPOKE facilities do not tend to change significantly over time. CNSC staff noted that it is common that SLOWPOKE licensees have complimentary documents to reflect updates to the SLOWPOKE facilities' maintenance and operations as required.
148. The Commission noted differences in the texts of the licence and the LCH for certain conditions of licence. CNSC staff indicated that as the licence is a legal document, the LCH will be amended so that the wording for the conditions of licence is identical in

⁷ R.S.C., 1985, c. N-28.

both documents.

149. On the basis of this information, the Commission concludes that issuing a licence for a period of 10 years is appropriate. The Commission accepts the licence conditions as recommended by CNSC staff. The Commission is also in agreement with the level of delegation of authority in the LCH and notes that, if necessary, any matter can be heard at a Commission hearing.
150. The Commission notes the concerns of SLOWPOKE reactor licensees regarding the length and complexity of the LCH, and encouraged them to submit proposals to CNSC staff for simplifying the document.

4.0 CONCLUSION

151. The Commission has considered the information and submissions of Polytechnique Montréal and CNSC staff, as presented in the material available for reference on the record.
152. The Commission concludes that, in accordance with the *Canadian Environmental Assessment Act*, an environmental assessment is not required for the operation Polytechnique Montréal's SLOWPOKE reactor.
153. The Commission considers that Polytechnique Montréal meets the requirements of subsection 24(4) of the *Nuclear Safety and Control Act*. The Commission is of the opinion that Polytechnique Montréal is qualified to carry out the activities authorized by the amended licences and that, in carrying out those activities, it will make adequate provisions for the protection of the environment, the health and safety of persons, the maintenance of national security, and take the measures required to implement international obligations to which Canada has agreed.
154. Therefore, pursuant to section 24 of the *Nuclear Safety and Control Act*, the Commission renews operating licence for a non-power reactor PERFP-9A.02/2013, which authorizes Polytechnique Montréal to operate its SLOWPOKE-2 nuclear reactor. The renewed licence, PERFP-9A.00/2023, is valid from July 1, 2013, to June 30, 2023, unless it is suspended, amended, revoked or replaced.
155. In the licence, the Commission includes the conditions recommended by CNSC staff in CMD 13-H7.
156. The Commission also accepts CNSC staff's recommendation regarding the delegation of authority in the LCH. The Commission notes that CNSC staff can bring any matter to the Commission as applicable. The Commission directs CNSC staff to inform the Commission annually of any changes made to the LCH.
157. The Commission directs CNSC staff to submit annual reports on the performance of Polytechnique Montréal's SLOWPOKE nuclear reactor. CNSC staff shall present this

report at a public proceeding of the Commission.

158. The Commission directs CNSC staff to provide an update on the decommissioning plan and financial guarantee for the Polytechnique Montréal's SLOWPOKE reactor at the next annual report on SLOWPOKE reactors.



Michael Binder
Chairman
Canadian Nuclear Safety Commission

JUN 26 2013

Date